What is claimed is as follows:

Claims

Claim 1 A system and method for detecting and reporting the presence of non-

randomness in wafer data comprising the steps of:

reading input wafer data from a source

calculating a chi-squared value for each of a collection of sub-regions, using sub-

region relative area 'a', within a total region of area 1; and using event counts n1 inside

the region and n2 outside the region and the formula (where N=n1+n2)

$$(*) \qquad \chi^2 = [\, (n1 - aN)^2 \,/\, aN \,] + [\, (n2 - (1-a)N)^2 \,/\, (1-a)N \,]$$

determining if these chi-squared values satisfy a defined alarm condition and

generating an appropriate response

writing chi-squared results as output to a destination.

Claim 2 A system and method as described in Claim 1 where the system is implemented

as a stand alone computer connected to the data source and destination by a computer

network.

Claim 3 A system and method as described in Claim 1 where the system is implemented

within an embedded processor inside equipment which also performs other dedicated

tasks.

Claim 4 A system and method as described in Claim 1 where the set of sub-regions is

comprised of 6 lateral regions, 5 radial regions, and 4 axial regions. Where the lateral

regions are defined by diameter lines at 6 different angles in increments of 30 degrees starting from the horizontal. Where the radial regions are defined between concentric circles of different radii in increments of radius/5. Where the axial regions are defined with width diameter/3 and centered on axes at 4 different angles in 45 degree increments starting from the horizontal.

Claim 5 A system and method as described in Claim 1 where the alarm condition includes a test of the maximum chi-squared exceeding a designated threshold.

Claim 6 A system and method as described in Claim 1 where the events are defect positions in defect data.

Claim 7 A system and method as described in Claim 1 where the events are defined by electrical probe data on individual chips such that each chip is an event if its probed electrical values lie in designated numeric ranges.

Claim 8 A system and method as described in Claim 1 where the events are pre-filtered to eliminate some of the events from the calculation.

Claim 9 A system and method as described in Claim 7 where the chips with different probe characteristics are grouped to form the data used in the calculation.

Claim 10 A system and method as described in Claim 1 where the system is applied more than once to provide separate chi-squared summaries and these different results are combined afterwards to provide an alarm condition.

Claim 11 A system and method as described in Claim 1 where the sub-regions are rectangular tiles.

Claim 12 A system and method as described in Claim 1 where the sub-regions are angular sectors.

Claim 13 A system and method as described in Claim 1 where the sub-regions are user defined regions of the wafer, where the design matches a desired shape outline.

Claim 14 A system and method as described in Claim 1 where the events are the logical union, or composite, data from several wafers.

Claim 15 A system and method as described in Claim 1 where the data of a wafer is replaced with the data from a single reticle step on a wafer; and the sub-regions and areas are defined by reticle location rather than wafer location. The chi-squared calculation is done with events restricted to a single position of the reticle.